

PAPERS READ.

THE EXAMINATION OF KINOS AS AN AID IN THE
DIAGNOSIS OF EUCALYPTS.

PART III.—THE TURBID GROUP.

BY J. H. MAIDEN, F.L.S., F.C.S.

My third large group of kinos I call the turbid group,—certainly a descriptive name, as the members of it all form turbid solutions in water, owing to the presence of catechin. This sharply defines them from the other two groups. Another characteristic is their extreme friability.

This group contains a more heterogeneous collection of substances than do the other two, but beyond submitting a few suggestions as to the affinities of certain kinos comprehended in it, I do not propose to form additional groups at present, until the number of authentic specimens worked at by other observers or myself is very largely increased.

It follows, from the friable nature of kinos of this group, and the way in which they fall to pieces as soon as they get dry, that "Turbid Kinos" are always in small fragments, while the ruby and gummy ones are frequently in agglutinated masses of a considerable size, which require some force to break up. As a consequence of the foregoing the percentages of moisture are comparatively low.

Description of a typical Kino of the Turbid group.

Colour reddish-brown, with the following exceptions: *E. maculata*, *E. microcorys*. Most of them, perhaps all, possess an odour, at least when perfectly fresh. Bright looking when perfectly

fresh and unhandled, but, in a few weeks in small fragments, dulled by their own disintegration. They powder readily between the fingers, forming a fine powder which, in the majority of instances, is of a buff colour.

What this Kino research enables us to do.

1. To pronounce whether a kino is the product of a *Eucalypt* belonging to the *Renanthereæ* or not.

2. To confirm the affinity existing between stringybarks, ironbarks, boxes, &c. It is a useful adjunct to, and check upon, the cortical system, which is of course founded on external characteristics merely. *Eucalypts* sometimes have variable bark, but, as far as known, the kino of a particular species is constant in character.

3. To furnish a guide in points of difficulty which arise in cases where diagnosis in the ordinary manner (*e.g.*, by flowers and fruits) breaks down. See *leucorhylon*, *fasciculosa*, *infra*.

4. To name, in some instances (*e.g.*, *maculata*, *corymbosa*), a species from kino alone.

5. To state whether a kino contains catechin from physical characteristics alone.

6. To pronounce what species are suitable for tincture-making and what are unsuitable. Partly dependent on the foregoing we are now in a position to indicate what species satisfy the requirements of pharmacopœias for kino, and what do not.

It must be remembered that the systematic examination of kinos is only just beginning.

I desire to express my obligations to Mr. H. G. Smith, Laboratory Assistant, Technological Museum, for valuable assistance in this research.

Attention is drawn to the fact that the kinos of *Eucalyptus maculata* and *E. microcorys* are anomalous; they differ from the others in regard to colour, so much so, that they can be singled out from all others (so far as is at present known) by this colour-test

alone. At the same time, other kinos tend to this colour, and it may be that a regular gradation of kino-colours will be found, as our knowledge of authentic species of these substances increases.

It is also worthy of note that *E. microcorys* is the only* kino of the turbid group belonging to the Renantheræ. Its resemblance to that of *E. maculata* is very marked, and it is as different as possible from any other Renantherous kino. It is worth enquiring of what value this observation may be, as bearing upon the affinities of *E. microcorys*.

The order in which kinos belonging to this group are placed is only provisional, as at present under 30 species belong to the group as the result of absolute experiment, and very much more material requires to be accumulated, in order that one may be in a position to subdivide it with any degree of finality. It promises to be the largest of the kino groups, and while already I can predict a number of species which will fall into it, I confine myself strictly to facts. Following are the species referred to in this paper :—

E. hemiphloia

„ „ var. *albens* = *E. albens*

E. odorata

E. melliodora

E. fasciculosa (non *E. paniculata*, Sm.)

E. corynocalyx

E. leucoxylon (non *E. sideroxylon*, A. Cunn.)

E. cornuta

E. rostrata

E. viminalis

E. Stuartiana

E. Maidenii

E. Gunnii

E. goniocalyx

E. Bäuerlenii

* The only species of the Renantheræ I have not examined is *E. acmenoides*; see p. 606, Vol. iv., Series 2.

E. punctata
E. longifolia
E. corymbosa
E. terminalis
E. eximia
E. clavigera
E. tessellaris
E. maculata
E. microcorys

and, as the results of the experiments of others :—

E. calophylla
E. globulus
E. trachyphloia

“ BOX ” PROVISIONAL SUB-GROUP.

E. hemiphloia
E. odorata
E. melliodora.

E. fasciculosa kino seems to form a kind of connecting link between these and

E. corynocalyx
E. leucoxydon
E. cornuta

EUCALYPTUS HEMIPHLOIA, F.v.M., B.Fl. iii. 216.

No. 35. “ Box ” or “ White Box.” Nerriga, N.S.W. Kino collected October, 1888. Height of trees, 80-120 feet. Diam., 2-3 feet.

A freshly exuded, more than ordinarily bright-looking kino. It very much resembles light seed-lac in colour and general appearance. Friability and colour of powder normal. Its composition is :—

Catechin and tannic acid ...	...	78.4
Gum ... ..	...	nil
Ligneous matter, &c. ...	...	2.3
Moisture ... ..	...	19.2
Ash ... ..	...	.1

100.00

Tannic acid determination (Löwenthal), 34.539 per cent. This kino was analysed November, 1888.

The catechin and tannic acid in these kinos were determined together by extraction with alcohol. The tannic acid was separately determined by Löwenthal's process (on an original aqueous solution). I cannot go further, in this place, into the chemical questions involved; this will be dealt with in a monograph on the whole subject of kinos. I may mention, however, that Löwenthal's process is only of limited application in the determination of tannic acid in turbid kinos, and the figures given in this paper of Löwenthal determinations have comparative values only. For medicinal or tanning purposes, the results obtained by Löwenthal's method will be a guide as far as practical astringent value is concerned.

No. 36. "Box." Dromedary Mountain, Tilba Tilba, N.S.W.; collected September, 1889, from trees 80-120 feet in height, and with a diameter of 2.4 feet.

This kino resembles the previous one so closely that no second description is necessary.

No. 37. Sample from Wagga Wagga, N.S.W.; collected October, 1889. Tree known locally as "Grey Box."

Collected and presented by Mr. J. J. Fletcher, M.A., B. Sc., Director of this Society, who described its appearance as like a boss, and that it had thrust up the bark of the tree as if it had been so much paper. The sample principally consists of a large oval mass, over an inch in thickness; it had solidified in this shape while adherent to the bark; externally it is of a dull brown colour; on the freshly fractured surface it is bright in appearance.

Friability normal, the colour of the powder being a very light buff. It contains a large amount of catechin. This sample may be taken as one of the most strongly defined of the kinos of this group yet examined by me, and may be considered as an extreme type; the amount of catechin remaining as a very light yellowish powder after the tannic acid has been dissolved out with cold water is very large; on standing the water does not become clear. Analysis (made August, 1891) shows its composition to be:—

Catechin and tannic acid	...	84.43
Ligneous matter, &c.	...	4.0
Moisture ...	...	9.94
Ash ...	...	1.63
		<hr/> 100.00

Tannic acid determination (Löwenthal), 15.2 per cent.

No. 38. I have received a specimen of kino, also from the Wagga Wagga district, labelled "White Box, *E. populifolia*." From its composition and general appearance, and also partly because *E. hemiphloia* is the common "White or Grey Box" about Wagga, I am inclined, as I am unable to get herbarium specimens to settle the matter, to place this kino with *E. hemiphloia*. In fact, I look upon this as an instance of the usefulness of kinos as a check upon species-naming.

This kino is dull in appearance. Friability normal; colour of powder light buff or raw sienna. It does not dissolve entirely in water, the catechin remaining as a light yellow powder; the colour of the water is that of a weak infusion of tea; it remains slightly turbid.

Analysis (made August, 1891) shows it to be composed of:—

Catechin and tannic acid	...	90.05
Ligneous matter, &c.	...	4
Moisture ...	...	8.71
Ash ...	...	84
		<hr/> 100.00

Tannic acid determination (Löwenthal), 14.5 per cent.

No. 39. I have received (July, 1891) a sample of kino, most probably collected in Victoria, and labelled "*E. hemiphloia*." It is tough, not the least friable, of a dark reddish-brown colour externally, but by transmitted light it is of a bright ruby colour. Its physical characteristics are quite different from kinos of the turbid group hitherto examined by me. I do not hesitate to say that the tree producing it, although ranking under *E. hemiphloia*, is specifically distinct. I draw attention to the subject, as a revision of the trees grouped under *E. hemiphloia* may be desirable.

EUCALYPTUS HEMIPHLOIA, F.v.M. var. *ALBENS* (Syn. *E. albens*, Miq.), B.Fl. iii. 219.

No. 40. "Northern Box" of South Australia. Kino from South Australia, received from Baron von Mueller, August, 1891. Physical properties same as the normal species, and as will be seen below, the chemical properties are very similar also. Composition (determined August, 1891):—

Catechin and tannic acid	...	89.112
Ligneous matter	...	.89
Moisture	...	9.008
Ash	...	.99
		<hr/>
		100.000

Tannic acid determination (Löwenthal), 16.9 per cent.

EUCALYPTUS ODORATA, Behr, B.Fl. iii. 215.

No. 41. Kino from a variety known as "White Box" at Wongrabell, near Eden, N.S.W. Diam., 6-8 feet. Height, 100-150 feet; collected February, 1887. Apparently an old sample, and much contaminated with bark. Dull-looking, prevailing colour brown, and readily crumbling between the fingers to a brown powder. Its composition (determined October, 1888) is as follows:—

Catechin and tannic acid	...	78.24
Ligneous matter, &c.	...	1.66

Moisture ...	...	...	...	19·3
Ash ...	...	...	...	·8
				<hr/> 100·00

Tannic acid determination (Löwenthal), 23·873 per cent.

EUCALYPTUS MELLIODORA, A. Cunn., B.Fl. iii. 210.

No. 42. The ordinary "Yellow Box." Kino received from Baron von Mueller, July, 1891. In very small pieces of a light brown colour, both in colour and appearance resembling small currants; powders between the fingers to a light yellow colour. I have not sufficient for a complete investigation, but I place it here from a general examination.

EUCALYPTUS FASCICULOSA, F.v.M. in Trans. Vict. Inst. Vol. I. (1854).

This species has long been looked upon as a form of *E. paniculata*, Sm. (see B.Fl. iii. 211, and Decade 5, Mueller's *Eucalyptographia*). As the discrimination of the two species is important, I think it necessary to go into the matter with a little detail.

Under the name of *E. paniculata* are usually enumerated two distinct trees, viz. :—A New South Wales ironbark (the tree on which Smith founded the species), and a (Victorian and) South Australian white gum, with smoothish white bark as its name denotes. The timbers of the two trees are also totally different. This confusion caused Bentham to write (B.Fl. iii. 211), "The notes on the bark uncertain." In making a rough grouping of Eucalypts according to the vernacular names, he adopts the name "White Gum," B.Fl. iii. 189, and leaves it out of the list of "Ironbarks."

I give a few notes on the trees known as *E. paniculata* in the colonies of New South Wales, Victoria, and South Australia. I have not dwelt upon the inflorescence and fruits, as these are palpably similar in the various trees referred to, and afford an instance in which determinations from such material break down. To discriminate between certain Eucalypts, the bark, timber, or kino (or all three), should be taken into consideration.

New South Wales.—"She Ironbark" (Woolls, B.Fl. iii. 211). It is the "Red Ironbark" of the Southern Coast districts (*E. paniculata*); var. *angustifolia* is "Narrow-leaved Ironbark" (Woolls, B.Fl. iii. 212).

Victoria.—Bark persistent, hard and rough, or by outer decortication whitish and smooth outside. "The Box-Ironbark Tree" (Mueller), *Dichotomous Key*. This is *E. fasciculosa*.

South Australia.—"White Gum" (Behr, B.Fl. iii. 212). It is gured in Brown's *Forest Flora of S.A.* and called by him "Panicle-flowered White Gum" in order to distinguish it from the other white gums of that colony. From the description of the bark, and the figure of it given, it is at once seen that the South Australian *paniculata* (*E. fasciculosa*) is quite a different species from our New South Wales ironbark of that name. The colour of the South Australian timber is not given; that of our ironbark is medium red.

No. 43. Kino received from W. Gill, Esq., F.L.S., Conservator of Forests, South Australia, July, 1891. Known locally as "White Gum."

The physical properties of this kino resemble those of a typical kino of the group. Composition (determined August, 1891):—

Catechin and tannic acid	...	83.384
Ligneous matter, &c.	...	6
Moisture	...	15.78
Ash	...	236

100.000

Tannic acid determination (Löwenthal), 24.1 per cent.

EUCALYPTUS CORYNOCALYX, F.v.M. B.Fl. iii. 218.

The Sugar Gum of South Australia. "Slowly but completely soluble in water; solution slightly acid, yellow-red, on cooling turbid, no gum-resin. Broken reddish-brown lumps, fatty lustre, mixed with particles of bark" (Wiesner, Zeitschr. d'allg. Æst. Apotheker-Vereines, 1871; Pharm. Journ. [3] ii. 102).

No. 44. A specimen received from W. Gill, Esq., F.L.S., Conservator of Forests, S.A., July, 1891, is in small pieces, very dull externally. Friability normal. Colour of unground kino a dull sienna-brown, colour of powder ochre-yellow.

It does not entirely dissolve in cold water; the supernatant liquid is pale yellowish, and it does not entirely dissolve in alcohol; the liquid becomes clear on standing, but on agitation has a very turbid appearance. Its composition (determined August, 1891) is:—

Catechin and tannic acid	...	82·471
Ligneous matter, &c.	... ..	3·827
Moisture	... ..	13·370
Ash	... ..	·332
		<hr/>
		100·000

Tannic acid determination (Löwenthal), 26·2 per cent.

EUCALYPTUS LEUCOXYLON, F.v.M. B.Fl. iii. 209, and Decade 1,
Mueller's *Eucalyptographia*.

Under the above name two distinct trees have been included, viz.:—A New South Wales ironbark, and a white or blue gum found in Victoria and South Australia. The New South Wales tree is *E. sideroxylon*, A. Cunn., the southern one is *E. leucoxylon*, F.v.M., a tree with a pale-coloured wood as its name denotes, while the N.S.W. ironbark has red timber, and also one of quite a different character to the other. I give notes under the heading of each colony to help to set the matter clear, and would point out that in this instance examination of the kinos is a valuable help, showing that the products of the N.S.W. ironbark and the Victorian or South Australian white gum are very different.

New South Wales. Syn. *E. sideroxylon*, A. Cunn.—The “Red Flowering Ironbark”; it, however, sometimes has white flowers. Red ironbark of Mudgee district (Hamilton) and other parts of the colony.

In a “Note on *Eucalyptus leucoxylon*, F.v.M.,” by the Rev. Dr. Woolls (P.L.S.N.S.W. [2], i. 859), this matter of the confusion

which has arisen between the two trees is clearly set forth, and I am but emphasizing Dr. Woolls' remarks in the paper referred to. I have for some years been impressed with their specific differences, and the use of the name *leucoxylon* in my former paper (P.L.S.N.S.W. [2], iv. 1277) for *sideroxylon* is a slip of the pen.

Victoria.—Bark either rugged, hard, dark and persistent, or decorticating and then smooth and whitish outside. The "Victorian Iron-bark Tree" (Mueller, *Dichotomous Key*); see also *Eucalyptographia*, where it is stated:—"This is the iron-bark tree of Victoria and many districts of New South Wales." This is a slip of the pen as regards Victoria, the tree being not a true iron-bark in that colony, although sometimes having rugged bark about the butt. The Victorian species varies somewhat in bark in different localities.

Mr. W. R. Guilfoyle, exhibiting Victorian *E. leucoxylon* timber at the Sydney International Exhibition of 1879, describes it as "Milk white Gum or Spurious Iron-bark. Said to be synonymous with *E. sideroxylon*, the true iron-bark, although very distinct in appearance."

It is called "Iron-bark" in Howitt's paper (Trans. R. S. Vict. II. pt. 1). It is called "Box" at p. 215, and "Spurious Ironbark" at p. 226 of the Official Record, Intercol. Exh. of Australasia, Melbourne, 1867, a scientific publication of great value.

South Australia.—Figured as the "Blue Gum" in J. E. Brown's "Forest Flora of S.A." The specimens on which the species-name *leucoxylon* was founded by Baron Mueller, were obtained from near Adelaide. Known also in South Australia as "White Gum."

"On the matured trees the bark upon the stem is hard, woody, rugged, and of a dark bluish-grey—sometimes almost black—on the surface and brown beneath; it falls off in curled, broken up, longitudinal pieces two or three feet long, and from a-half to one inch in thickness" (J. E. Brown). This is, of course, quite different to an ironbark.

Queensland.—The following note on a Queensland form of *leucoxylon* has no direct bearing on the point at issue (viz.

sideroxylon and *leucoxylon* being distinct species), but I give it for completeness. The typical *E. sideroxylon* does not appear to extend to Queensland.

"*E. leucoxylon*": bark white on the branches, more persistent on the trunk; var. *minor*, C. Ext. (Bailey). See also Scortechini, P.L.S.N.S.W. viii. 248, who states that this variety barely crosses the boundaries of Queensland, near Wilson's Peak, South Queensland.

Memo.—Bentham (B.Fl. iii. 210) states "this variety seems almost to pass into *E. melliodora*," and certainly the kino of that species and that of *E. leucoxylon*, F.v.M., strongly resemble each other.

No. 45. "Blue Gum" of South Australia. Kino received from Mr. W. Gill, F.L.S., Conservator of Forests, South Australia, July, 1891.

This is apparently a freshly exuded sample, being very bright and sparkling in appearance. Its general colour is a warm sienna-brown; it is easily reducible to a powder between the fingers, such powder having a bright yellow colour, almost chrome. It is very new, which accounts for some of the brightness of colour. Its general behaviour at once places this kino in the turbid group.

Behaviour and appearance in water similar to *E. corynocalyx* sample. In alcohol it does not entirely dissolve; the supernatant liquid is bright, clear, and of a reddish-brown colour; the liquid is very turbid when agitated.

Its composition (determined August, 1891) is:—

Catechin and tannic acid	...	...	79.279
Ligneous matter, &c.	...	...	4.9
Moisture	...	...	14.95
Ash	...	...	.871

100.000

Tannic acid determination (Löwenthal) 21.5 per cent.

MM. E. Heckel and Fr. Schlagdenhauffen (*Le Naturaliste*, July 1, 1890, p. 151) have been experimenting upon some kinos

of *E. leucoxylon* and *E. viminalis* received from M. Ch. Naudin of the Villa Thuret, Antibes, France, where is a celebrated plantation of many species of *Eucalyptus*. I will refer to *E. viminalis* under that heading, and would observe that apart from the evidence yielded by the experiments on the kinos themselves, the *leucoxylon* trees must have been raised from seed of trees indigenous to Victoria or South Australia.

Following is their analysis :—

Eau hygroskopique	...	...	18.94
Sels fixes ...	...	...	1.32
Tannin et catéchine	...	...	74.95
Gomme ...	...	...	2.74
Débris cellulaires...	...	...	1.51
Perte ...	...	...	0.54

100.00

The constituent in the above analysis worth noting is the gum. Obviously the conditions under which these trees grow favour the development of gum, as this substance, though always carefully looked for, is absent in turbid kinos obtained from Australian grown trees. In several species I have believed that I have found gum (never much more than a barely weighable quantity, however), but on more thorough examination the substance is found not to be precipitable by alcohol. Care must be taken to remove all catechins before the alcohol is added.

EUCALYPTUS CORNUTA, Labill. B.Fl. iii. 234.

No. 46. The "Yeit" or "Yate" of Western Australia. Specimen of kino received from Baron von Mueller, July, 1891.

General appearance, friability, and colour of powder normal. It does not entirely dissolve in cold water; it forms a dirty brown liquid, which does not settle readily. It does not entirely dissolve in alcohol, the supernatant liquid is clear and bright, but when agitated it forms a very turbid liquid of a dirty brown colour.

Its composition is as follows :—

Catechin and tannic acid	...	80·9
Ligneous matter, &c.	... ..	2·51
Moisture ... ..	...	15·72
Ash ... ..	...	·87
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 36·1 per cent. It was analysed August, 1891.

The following species, viz. :—

<i>E. rostrata</i>	<i>E. Maidenii</i>
<i>E. viminalis</i>	<i>E. Gunnii</i>
<i>E. Stuartiana</i>	<i>E. goniocalyx</i>
and perhaps <i>E. Bäuerlenii</i>	

yield kinos possessing many points of resemblance, and are grouped together provisionally.

EUCALYPTUS ROSTRATA, Schlecht., B.Fl. iii. 240.

The well-known “Red Gum” of Victoria and the Murray and Edwards Rivers, N.S.W.

The kino of this species is perhaps the best known of all Eucalyptus kinos, chiefly through the enterprise of Mr. Joseph Bosisto, of Melbourne.

It is a useful astringent, and it seems to be increasing in favour with medical men in England, America, and Australia.

The official kino (*Pterocarpus*) contains, I believe, no substance which is not contained in this and some allied kinos, for which they appear to be a perfect substitute. See *Pharm. Journ.* [3], xx. 221, 321.

The kino of *E. rostrata* will be found mentioned in all modern works on Materia Medica. In Martindale and Westcott's *Extra Pharmacopœia*, for instance, we have the following :—“*E. rostrata* and *E. corymbosa*, and probably other species imported from Australia. It is semi-translucent and garnet-coloured, not so

dark as, but resembling kino in appearance, soluble in water, tough, difficult to powder [not correct as applied to these two kinos, J. H. M.], it adheres to the teeth when chewed, is intensely astringent to the mucous membrane, useful in diarrhœa, relaxed throats, and given with success to check the purging of mercurial pills."

But the following statements pertaining to the percentage of tannic acid, and the solubility, are somewhat misleading, since I have shown the enormous variation in the properties of kinos caused by age.

"Of 100 parts 90 are dissolved in cold water, the solution being clear. 27 parts of isinglass precipitate all the astringent matter." *Squires' Companion to the B.P.*

Dr. Wiesner says of a sample :—"Easily soluble in water and alcohol ; solution neutral, free from gum-resin. Broken masses of a zircon-red, sometimes light brown, mixed with bits of dark."

47. "Red Gum;" purchased in Sydney, 22nd November, 1888. Of Victorian origin.

In lumps up to the size of peas, though angular. Prevailing colour purplish-brown. Is readily powdered between the fingers, forming an ochrey-brown powder. The mass of kino has not the brilliant appearance of the kinos of the ruby group, owing to this friability.

In cold water it dissolves fairly readily and almost entirely to a reddish-brown liquid.

Its composition (determined November, 1888) is :—

Catechin and tannic acid	...	84·3
Ligneous matter, &c.	...	·3
Moisture ...	...	15·2
Ash ...	...	·2
<hr/>		
100·00		

Tannic acid determination (Löwenthal) 46·22 per cent.

No. 47. E. ROSTRATA, var. "Creek Gum," Tarella, Wilcannia, 23rd August, 1887. Diam., 1-2 feet. Height, 30-40 feet.

Only obtainable in rather small quantities, and in rather small pieces. Pale, as kinos go, very bright-looking, and of a ruby colour. Powders fairly readily, forming a powder of a light brown tint.

It dissolves almost immediately to a pale brownish or almost orange solution, leaving a sediment of a whitish-salmon colour, with a few dark-coloured particles, like those of *E. goniocalyx*, only cleaner looking.

Its composition (determined October, 1888) is :—

Catechin and tannic acid	...	82·7
Ligneous matter, &c.	...	·6
Moisture ... ..	...	15·8
Ash ... ..	...	·9
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 47·746 per cent.

EUCALYPTUS VIMINALIS, Labill. (Syn. *E. fabrorum*, Schlecht.),
B.Fl. iii. 239.

Dr. Wiesner says of two samples of kino belonging to this species :—" *E. viminalis*. Only partly soluble in water, with light brown colour; contains a little gum-resin. Brittle, like kino. Add hydrochloric acid to the solution, then ammonia, a precipitate is obtained which blackens in the air."

" *E. fabrorum*, not readily soluble in water: solution yellowish, faintly acid, turbid on cooling; contains gum-resin. Particles dark black-red, slightly transparent shiny fracture."

The following statement occurs in the Report Intercol. Exhib., Melbourne, 1861 :—"The resin (*sic*) of *E. viminalis* in its decomposed state furnishes a real pigment."

No. 48. "Ribbony Gum," "Manna Gum." This is a variety with bluish, broad leaves. Quiedong, near N.S.W.: Victorian border, 26th March, 1887. Height, 60-80 feet. Diam., 3-4 feet.

In small fragments, prevailing colour reddish-brown of all depths of tint. Bright-looking. Easily reducible to a powder between the fingers. Colour of powder light orange-brown.

In cold water it forms a solution of an orange-yellow colour, something like linseed oil. Residue of a pale salmon colour, with a few dark particles. Of the strength of 1 grm. to 1 litre a beautiful clear solution of a dark amber colour is formed.

Its composition (determined October, 1888) is:—

Catechin and tannic acid	...	...	82·9
Ligneous matter, &c.	...	...	·8
Moisture	...	...	15·8
Ash	...	...	·5
<hr/>			
			100·00

Tannic acid determination (Löwenthal) 31·99 per cent.

No. 49. A sample procured by me from Mt. Victoria, N.S.W., March, 1889, was perfectly fresh, and some of it was even treacly when collected, though like other kinos of this group it dries almost immediately. It is orange-brown of all tints, and very crumbly, new as it is. I have not sufficient for a complete investigation.

It was from a tree which may provisionally be known as the variety *multiflora* of this species.

Messrs. Heckel & Schlagdenhauffen (*op. cit.*, p. 151) have examined kinos of this species grown in the South of France.

Following is their analysis:—

Eau hygroscopique	...	...	7·083
Cendres	...	...	0·250
Tannin et catéchine	...	...	92·667

100·000

on which they make the following remarks:—

“La quantité de tannin renfermée dans le kino d’ *E. viminalis* est extraordinairement considérable, et semble en promettre un emploi industriel assuré.”

EUCALYPTUS STUARTIANA, F.v.M., B.Fl. iii. 243.

No. 50. The collector of this kino, Mr. W. Bäuerlen, states that when collecting it on the borders of Victoria and New

South Wales, some ladies, who saw him thus occupied, assured him that they knew of nothing which cleanses the teeth so quickly and so effectually as this kino. Its friability combined with its astringency have doubtless secured it this reputation as a dentifrice. *E. rostrata* kino is similarly used on the Murray.

"Apple-tree," Quiedong, 24th April, 1887. Diam., 3-4 feet. Height, 80-100 feet.

This is a comparatively dull-looking kino, having somewhat the appearance of seed-lac, and the particles are equally variable in point of colour. Exceedingly brittle and forming a powder of a dull sienna-brown.

In twenty-four hours it completely disintegrates under water, forming two well-defined layers. The sediment is of an ochrey-brown colour, while the supernatant liquid is of a dark reddish-brown. The behaviour of this kino is very much the same as that of *E. viminalis*.

Its composition (determined October, 1888) is:—

Catechin and tannic acid ...	..	83·0
Ligneous matter, &c. ...	...	1·0
Moisture ...	...	15·3
Ash ...	...	·7
		<hr/> 100·00

Tannic acid determination (Löwenthal) 26·412 per cent.

EUCALYPTUS MAIDENI, F.v.M., in P.L.S.N.S.W. [2], iv. 1020.

"Blue Gum"; called also "White or Spotted Gum."

Until quite recently this tree had been only cursorily examined; it was for many years looked upon as *E. globulus*, and surprise was expressed that *E. globulus* had such a wide range in New South Wales. The Rev. Robert Collie found it several years ago between Braidwood and Araluen, announced it to be *E. globulus* (to which, indeed, it bears much resemblance), and this statement has been copied into several books. Had not such prominence been given to the statement, it would not now be

necessary to contradict it at such length. To be specific, *E. globulus* does *not* occur in the county of St. Vincent, or so far east; it is only here and there, and then sparsely, found on the N.S.W. side of the Murray. *E. Maideni* is a common tree on the mountains about Araluen, where it is called "Blue Gum." *E. globulus* has been specially looked for, during six seasons, from Shoalhaven to the Victorian border, but without success, and the specimens seen, referred to *E. globulus* by local people, all belong to the species named *E. Maideni* by Baron von Mueller.

No. 51. From Colombo, Candelo, N.S.W., "Blue Gum." Height, 80 to 120 feet. Diam., 2 to 5 feet.

This sample has a brighter appearance externally than the majority of kinos belonging to this group; it is of a dark sienna colour, powders readily between the fingers, the powder having an ochrey colour. Dissolves in water almost entirely to a dirty brown colour, the water remaining very turbid.

Its composition (determined August, 1891) is:—

Catechin and tannic acid	...	79.75
Ligneous matter, &c.	...	3.2
Moisture	...	15.77
Ash	...	1.28
		<hr/>
		100.00

Tannic acid determination (Löwenthal) 25.5 per cent.

No. 52. "Blue Gum," from Bolaro Mountain, gathered Sept., 1890. Height of tree, 150 feet. Diam., 2 feet.

Resembles previous specimen in appearance.

EUCALYPTUS GUNNII, Hook., B.Fl. iii. 246.

No. 53. The kino examined is from a variety known as "Flooded or Bastard Gum," and was obtained from Delegate, near the Victorian border. Collected May, 1887. Height of trees, 60-80 feet. Diam., 2-3 feet.

Appearance and friability normal. Cold water yields a pale orange solution, leaving a quantity of sediment of a salmon colour, in which are interspersed a few dark coloured particles.

Its composition (determined October, 1888) is :—

Catechin and tannic acid	...	79·22
Ligneous matter, &c.	...	·78
Moisture ...	...	19·6
Ash ...	...	·4
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 34·032 per cent.

EUCALYPTUS GONIOCALYX, F.v.M., B.Fl. iii. 229.

Usually known as “Spotted Gum” in Victoria, but not to be confused with the common N.S.W. “Spotted Gum” (*E. maculata*).

No. 54. Specimen of kino from Bonang, near Delegate, where the tree is known as “Mountain Gum.” Height of trees, 100-180 feet. Diam., 4-8 feet. Kino collected May, 1887.

This sample is the dullest looking of all the kinos examined, friability normal. It yields a brown powder. The general colour of the unground portion is purplish-brown. The bulk of this sample is much older than that of the sample of *E. rostrata* (No. 47), but specimens taken from bulk cannot in any way be distinguished from it from outward appearances.

In cold water it forms a light reddish-brown turbid liquid, leaving a muddy-looking residue of a salmon colour; like most kinos of this group, it is exceedingly tedious to extract the last portions of soluble matter.

Following is its composition (from analysis made October, 1888) :—

Catechin and tannic acid	...	76·02
Ligneous matter, &c.	...	1·02
Moisture ...	...	22·1
Ash ...	...	·86
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 35·555 per cent.

EUCALYPTUS BAUERLENI, F.V.M. in Victorian Naturalist, October, 1890.

No. 55. This species is confined to South-eastern New South Wales. Sample of kino obtained from Sugar-loaf Mountain, Braidwood, N.S.W., September, 1890, from trees 40 feet high, with a diameter of 6 inches.

A fresh, bright-looking kino of a reddish-brown colour, friability and colour of powder normal. I have not sufficient kino, at present, to make a complete examination of it.

The kinos of the following species

E. punctata

E. longifolia

differ from each other, and appear to have no close affinities with any of the previously described kinos.

EUCALYPTUS PUNCTATA, DC.

No. 56. "Grey Gum" or "Leather-jacket." The Valley, Blue Mountains, N.S.W., 3rd April, 1888. Height, 80 feet. Diam., 3 feet.

This kino, especially when in large masses, somewhat resembles hepatic aloes in appearance, but it is far more brittle than that substance, crumbling without much difficulty by pressure of the fingers. Its colour may be described as of very dark brown, with a slight orange tint, and comparing it with still another substance, one from the mineral kingdom, it is much like the so-called melanite garnets from Franklin, New Jersey, U.S.A. The colour of this and many other gums, resins, &c., cannot be distinctively described without making a comparison with the tint of some well-known substance. The powder is of an ochre colour, slightly more brown than Oxford ochre.

When freshly gathered it has a vinous odour, somewhat similar to, but less powerful than that of the kino of *E. maculata*. I happened to tap quite a reservoir of 8 or 10lbs. of this kino, which

was as fluid as molasses at first, but on a few moments' exposure to the air it hardened, and became quite brittle.

In cold water the bottom layer of liquid is of a rich reddish-brown, the rest of the liquid becoming, by diffusion, of the colour of olive oil. Abundant sediment.

Following is the composition of this kino (analyses made October, 1888).

Catechin and tannic acid ...	...	81.3
Ligneous matter, &c. ...	...	.9
Moisture ...	...	17.6
Ash ...	...	.2
		<hr/>
		100.00

Tannic acid determination (Löwenthal) 31.99 per cent.

No. 57. Cambewarra (Bangley Creek), 21st and 27th April, 1888. Height, 50-60 feet. Diam., 2-3 feet.

The collector of this specimen said, "the kino of this Eucalypt is very rare, and very seldom shows itself outside on the tree; it usually collects in blisters under the bark, and those blisters are mostly on the branches or high up on the stem." My own experience is that, while this is not a plentiful kino, one occasionally comes upon masses containing several pounds, by following a fissure in the bark, near the ground. The present sample has evidently remained long on the trees, and is therefore of a dull colour for the most part, but individual pieces are exactly described by the description already given of the preceding specimen.

No. 58. Bangley Creek, Cambewarra, May and June, 1888. The description of No. 57 will apply here.

Analysis of this kino (made October, 1888) gave:—

Catechin and tannic acid ...	...	81.8
Ligneous matter, &c. ...	...	.4
Moisture ...	...	17.5
Ash ...	...	.3
		<hr/>
		100.00

Tannic acid determination (Löwenthal) 34.031 per cent.

EUCALYPTUS LONGIFOLIA, Link et Otto, B.Fl. iii. 226.

No. 59. Usually known as "Woolly Butt." "The timber often traversed by kino-sediments" (Mueller). Specimen of kino from Dromedary Mountain, Tilba Tilba, N.S.W., where it is locally known as "Peppermint." Collected 13th September, 1889. Height, 80-100 feet. Diam., 2 to 6 feet.

This kino is dull looking, and of a dark brown colour, it does not powder readily between the fingers, it has a very bright fracture.

It dissolves almost entirely in water, the liquid remaining very turbid. In alcohol the colour is lighter than in the majority of kinos of this group; the appearance of turbid kinos when dissolved in alcohol is, however, often so much alike, that it is sometimes difficult to point out any distinction in their behaviour in this solvent.

Analysis (made August, 1891) gives :—

Catechin and tannic acid	...	77.76
Ligneous matter, &c.	... ..	2.0
Moisture ... ..	...	19.83
Ash ... ..	...	.41
		<hr/>
		100.00

Tannic acid determination (Löwenthal) 19.5 per cent.

"BLOODWOOD" PROVISIONAL SUB-GROUP.

including :—

<i>E. corymbosa</i> ,	<i>E. tessellaris</i> appears to connect
<i>E. terminalis</i> ,	this group with
<i>E. eximia</i> ,	<i>E. maculata</i> and
<i>E. clavigera</i> ,	<i>E. microcorys</i> .

EUCALYPTUS CORYMBOSA, Smith, B.Fl. iii. 256.

"Bloodwood." This tree is perhaps as fortunate in its vernacular name as any of the Eucalypts. When freshly exuded, the kino has all the appearance of a stream of blood, and so freely

does it flow that sometimes the appearance of the ground at the foot of one of these trees is quite startling. It dries almost immediately, except in damp weather, becoming exceedingly brittle. When freshly exuded it has a distinct smell, which as far as I know, is characteristic, and soon recognised. It is something of a vinous odour. Much of the kino exuded becomes entangled in the scaly porous bark, but one frequently comes across quite a store of the substance through tapping the communication with a reservoir which has collected behind the bark, or between the concentric circles of the wood; the passage gets choked up with indurated kino, but picking off the substance often causes the stream to flow afresh.

Lindley (Vegetable Kingdom, p. 737), says, "*E. robusta* contains large cavities in its stem, between the annual concentric circles of wood, filled with a most beautiful red or rich vermilion coloured gum." This description can only apply to *E. corymbosa*, as the very fresh kino is of an exceedingly brilliant colour, approaching to vermilion, but with a tinge of purple in it. So bright is even the old kino, that I believe I can infallibly recognise the produce of this species by this colour test alone.

"That (kino) from a species called 'Blood-tree' is heated (*sic*) in sheds (*sic*) by the blacks of Lake Macquarie, New South Wales, and applied to external wounds to make them heal." (Curtis' *Bot. Mag.*, Vol. 69, 4036).

"This kino is chiefly obtained by wood-cutters, being found in a viscid state in flattened cavities in the wood, and soon becoming inspissated, hard and brittle. Minor quantities are procured in a liquid state by incising the bark of living trees, forming a treacly fluid yielding 35 per cent. of solid kino on evaporation." (Lock, *Spon's Encyclopaedia*). This 35 per cent. is absurdly small, as the kino inspissates immediately; 95 to 99 per cent. of solid kino would be better. I would also point out that the kino collected from the outside is usually the best, as that which settles in the cavities is frequently contaminated with ligneous matter in a fine state of division (the exuviae of various larvæ), which reduces its solubility.

Staiger (Queensland Cat. Col. and Ind. Exh., 1886) says of a sample of this kino, "59·03 insoluble in water, 10·82 soluble in alcohol, leaving 48·21 per cent., which was mostly soluble in caustic soda. This insoluble substance was intensely black, and was partly derived from altered kino-tannin, and partly from other substances not yet thoroughly investigated."

Dr. Bancroft observes that, owing to the ready friability of this kino, it is very suitable for powders and pills. It is given in doses from 2 to 10 grains.

Dr. Wiesner (*loc. cit.*) says, "Of all samples received most readily soluble in water. Solution deep blood-red; smells distinctly like Bordeaux wine, slightly acid, turbid on cooling, free from gum-resin. Bright shining surface of fresh fracture of lumps. Colour deep red."

No. 60. Cambewarra, August, 1886. Diam., 3-4 feet. Height, 80-100 feet.

This sample is in irregular pieces as large as the fist. Before they have been bruised they have the appearance of a very pulverulent, purplish-red hæmatite (such, for instance, as is common in the Elba mines). To say that it resembles a low-grade dragon's blood also gives a very good idea of its appearance. It readily makes an impalpable powder of a Venetian red colour, soiling everything with which it comes into contact.

Bloodwood kino can be delivered in Sydney for about 3d. per lb., and there is no doubt that it is a cheap and efficient substitute for the lower grades of dragon's blood. Both the aqueous and alcoholic solutions (especially the latter) form good wood-stains. Experts will probably pronounce the colour to be too fiery, but it can be brought to the required tint by admixture with burnt sienna or vandyke brown.

This specimen was from a very old tree, and one nearly dead. It was not obtained by wounding the stem, but was found caked in large masses between the trunk and the bark.

With cold water it forms a rich garnet-coloured liquid at the bottom of the vessel if undisturbed. As diffusion proceeds, the

remainder of the liquid is of an amber colour ; sediment of a very dark red, and powdery. Alcohol yields a very bright red liquid.

It was analysed October, 1888, with the following result :—

Catechin and tannic acid	...	68·42
Ligneous matter, &c.	...	16·38
Moisture ...	...	14·7
Ash ...	...	·5

100·00

Tannic acid determination (Löwenthal) 45·714 per cent.

No. 61. The Valley, Springwood, Blue Mountains, N.S.W.
2nd April, 1888. Diam., 1 foot. Height, 50 feet.

This sample was also obtained from the concentric layers of a tree. When removed it was slightly plastic, and of a dark crimson colour, reminding one strikingly of a candied fruit jam. When fresh (and for some weeks afterwards) it had a vinous odour.

It behaves to cold water in the same manner as the preceding specimen, except that the colour is much brighter looking. Alcohol yields a very bright red liquid.

It was analysed October, 1888, with the following result :—

Catechin and tannic acid	...	63·18
Ligneous matter, &c.	...	20·12
Moisture ...	...	16·3
Ash ...	...	·4

100·00

Tannic acid determination (Löwenthal) 36·053 per cent.

No. 62. The Valley, Blue Mountains, 3rd April, 1888.

This kino was an outward exudation. It is rich coloured, and so excessively brittle that the vessel containing it readily becomes coated with a fine powder. In large masses it is of a purplish-red colour, while the powder inclines strongly to Indian-red. The colour of this kino when freshly exuded had all the brilliancy already described, but it tones down somewhat on keeping.

With cold water the solution is the same as that of No. 60 as far as colour is concerned, but the sediment instead of being powdery, is of a gelatinous consistence, and may be drawn out into threads. Alcohol yields a bright red liquid.

It was analysed October, 1888, with the following result :—

Catechin and tannic acid	...	82·4
Ligneous matter ...	...	1·1
Moisture ...	...	16·1
Ash ...	...	·4
		<hr/> 100·00

Tannic acid determination (Löwenthal) 56·888 per cent.

EUCALYPTUS TERMINALIS, F.v.M., B.Fl. iii. 257.

No. 63. "Bloodwood" of the interior of N.S.W. Whittabranah, Tibooburra, N.S.W. 29th October, 1887. Height, 30-40 feet. Diam., 1-2 feet.

This tree is for the most part sparsely distributed, and then only on rivers and creeks; also very few trees exude kino, and then only in small quantity. This sample has quite freshly exuded. It is in very small fragments with attached bark. It is of a pale ruby colour, and very bright looking. It is readily reducible to a powder between the fingers. Colour of powder dark salmon. It has a slight vinous smell.

In cold water it yields a pale orange-brown liquid with a light brown sediment, in appearance much like (though lighter than) some specimens of *E. corymbosa* kino.

It was analysed August, 1891, with the following result :—

Catechin and tannic acid ..	...	85·3
Ligneous matter, &c. ...	...	1·3
Moisture ...	...	13·2
Ash ..	...	·2
		<hr/> 100·0

Tannic acid determination (Löwenthal), 63·5 per cent., the highest percentage obtained during these investigations.

EUCALYPTUS EXIMIA, Schauer, B.Fl. iii. 258.

No. 64. "Mountain or Yellow Bloodwood." The Valley, near Springwood, N.S.W.; collected April, 1888. Height of tree, 70-80 feet; diam., 1-2 feet.

This kino is bright looking, much resembling the better samples of *E. corymbosa* kino, but the colour of the powder at once distinguishes it from that kino, the powder of *E. eximia* being of a dark buff colour, slightly darker than the majority of kinos of this group. The soft friable nature of the bark of this tree makes the collection of the kino a matter of difficulty, and it appears never to exude abundantly. In water it does not wholly dissolve; the liquid on standing becomes quite clear and transparent and of an amber colour.

It was analysed August, 1891, with the following result:—

Catechin and tannic acid	...	84.41
Ligneous matter, &c.	...	3.2
Moisture	...	11.99
Ash	...	.4
		<hr/>
		100.00

Tannic acid determination (Löwenthal), 47.5 per cent.

EUCALYPTUS CLAVIGERA, A. Cunn., B.Fl. iii. 250.

No. 65. Kino received November, 1889, from Baron von Mueller, who obtained it from Arnhem's Land, North Australia.

Bright looking, deep reddish-brown in colour. Friability and colour of powder normal.

In water it does not wholly dissolve, the catechin remaining as a yellow powder. On standing, the water becomes clear and transparent and of a bright amber colour.

Following is the analysis (made August, 1891) of this kino:—

Catechin and tannic acid	...	85.98
Ligneous matter, &c.	... ..	1.1
Moisture ... ..	...	12.63
Ash ... ..	...	.29
		<hr/>
		100.00

Tannic acid determination (Löwenthal), 44 per cent.

EUCALYPTUS TESSELLARIS, Hook., B.Fl. iii. 251.

“Moreton Bay Ash.” This kino has the property of exuding of a dark brown treacle colour, and soon becoming black without any tint of red. According to Mr. Staiger, quoted by Dr. Bancroft, it has a specific gravity of 1.35 and contains 71.7 per cent of matter soluble in boiling water, and on cooling the solution becomes turbid and deposits catechin. The portion insoluble in water is soluble in alcohol, and the residue, when treated with ether, leaves a dark coloured brittle mass identical with shellac, possessing the same qualities both technically and chemically,* and giving a good French polish of a rather darker colour than the usual commercial article. This shellac constitutes about one-fifth of the entire gum ; it is insoluble in benzine, kerosene and the essential oils. The portion dissolved by ether forms a pliable, reddish, transparent mass, which does not become dry, even after four or five days.

No. 66. “Moreton Bay Ash.” “Wonkara” of Pt. Curtis. Received from Mr. F. M. Bailey, Colonial Botanist, Queensland, 24th July, 1891.

This kino is of a reddish-brown colour, is easily powdered between the fingers, and the powder is of a light yellow colour. Its general appearance at once indicates the group to which it belongs. Its behaviour in water is much the same as that of *E. maculata*. It was analysed August, 1891, with the following result :—

* This is erroneous. The resin is not more than a trace (I can find none in my sample), but the catechin under some circumstances has a resinous appearance.

Catechin and tannic acid ...	...	82.1
Ligneous matter, &c. ...	...	2.1
Moisture ...	...	14.9
Ash ...	...	.9
		<hr/>
		100.0

Tannic acid determination (Löwenthal), 55.5 per cent.

EUCALYPTUS MACULATA, Hook., B.Fl. iii. 258.

The "Spotted Gum" of New South Wales and Queensland.

I am only aware of the existence of two previous analyses of this kino, but they differ exceedingly, and in the absence of the fullest details of the kinos, one cannot institute comparisons between them.

According to Mr. Staiger (quoted in Dr. J. Bancroft's "Contributions to Pharmacy from Queensland"), "this kino is entirely soluble in boiling water to the extent of 60 per cent. It contains benzoic acid in an impure state, and catechin. The gum insoluble in water is of a sticky nature. When dissolved in alcohol, and the solution evaporated in the air without artificial aid, a sticky, clear, reddish-brown, tasteless gum remained. If this is treated with ether, the sticky part of the gum goes into solution, and a dry, clear, reddish, tasteless gum remains possessing the qualities of shellac."

Mr. F. N. Grimwade (*Pharm. Journ.* [3], xvi., 1102) says of a sample, "Soluble in rectified spirit to the extent of 80.85 per cent.; cold water dissolved 18.9 per cent. Warm water extracted 'a slightly higher percentage.' The amount of volatile constituents was determined to be about 7.07 per cent., and consisted almost entirely of water, with the merest trace of a volatile oil, to which the peculiar aromatic odour, strongly resembling styrol, possessed by the gum, is due. By steam distilling 2 or 3 drops of this oil were obtained from about three-quarters of a pound of gum. 'I found no trace of either benzoic or cinnamic acids in the gum.'

"The tannic acid was found to be nearly allied to if not identical with querco-tannic acid, giving the blue-black precipitate

with ferric chloride, which is readily distinguished from the dirty green precipitate produced by kino-tannic acid, the variety existing in the B.P. kino. Percentage of tannic acid, 10 per cent."

Dr. Wiesner says, "*E. citriodora*,* Hook., easily soluble in water; solution faintly acid, smells like Bordeaux wine, yellow colour, turbid on cooling. Porous lumps with greenish lustre like Socrotine aloes; mixed with bark."

"*E. maculata*, Hook. Exactly like the last."

This is one of the kinos mentioned as quite suitable for replacing the official kino in *Spon's Encyc. of Industrial Arts*. It is, however, an unfortunate statement as regards this species, chiefly on account of its colour.

The kino from Cambewarra has quite a strong odour, something like decomposing apples or pears, or perhaps like a not perfectly sweet wine cask. But while the smell is hard to describe, it is easily recognised, and it appears to be characteristic.

That from New England has a smell similar to that which common resin gives out when held in the warm hand, while the other two samples have very faint aromatic odours. They all can be crushed between the fingers into a fine powder.

No. 67. Kino from Cambewarra, collected August, 1886. Height, 100-120 feet. Diam., 3-4 feet. Distinctly the darkest and most opaque looking of all the samples of this kino examined, with the exception of some fragments of No. 70. It is exceedingly brittle, even when in compact masses. The fracture is fairly bright, and shows a greasy lustre. Colour, olive-brown to reddish-brown. Forms a dull-looking powder of an olive-brown colour.

In cold water it forms a yellow solution of the tint of fresh and pure olive oil, leaving a resinoid catechin residue of a dirty brownish colour, very like soft toffee in appearance and with the odour already referred to. On long continued digestion with water it loses its resinoid texture and almost entirely dissolves.

* Now considered to be a variety of *E. maculata*.

Water at 100° C (1 grm. to 1 litre) yields a browner solution than No. 68 and very turbid. Alcohol (to form tincture B.P. strength) yields an olive-brown solution, with a dark olive-brown muddy residue, consisting largely of ligneous matter, and accompanied by a sticky substance. In ether a small percentage dissolves, and a lemon-yellow liquid is formed. The substance which gives the kino its odour is entirely taken up by the ether.

Following is an analysis, made October, 1888, of this kino :—

Catechin and tannic acid	...	84.25
Ligneous matter, &c.	... ..	1.95
Moisture ... ..	...	12.9
Ash ... ..	...	.9
<hr/>		
100.00		

Tannic acid determination (Löwenthal) 46.222 per cent.

No. 68. A specimen from New England, N.S.W., received 1886. A bright looking sample. It is third in depth of tint. Is excessively brittle, and of a light olive-brown colour. Colour of powder light dirty yellowish-brown, inclining to raw sienna.

The description of the action of cold water on No. 69 applies to this one, with the exception that the difficultly soluble particles of this kino display less tendency to aggregate. The liquid is darker in colour, being about intermediate between Nos. 67 and 69. Continued treatment with water deprives it of its viscid nature, and almost entirely dissolves it. Water at 100° C (1 grm. to 1 litre) yields an amber-coloured liquid, slightly brown and slightly turbid.

It was analysed October, 1888, with the following result :—

Catechin and tannic acid	...	86.75
Ligneous matter, &c.	... ..	.4
Moisture ... ..	...	12.7
Ash ... ..	...	.15
<hr/>		
100.00		

Tannic acid determination (Löwenthal) 51.809 per cent.

No. 69. Sample received from Mr. Charles Moore, Botanic Gardens, Sydney, 29th December, 1887.

This sample is the lightest in colour and most vesicular. Colour sienna-brown with a tinge of olive. Colour of powder raw sienna.

Cold water yields a solution of the tint of fresh and pure olive oil; the residue, of the colour and consistence of plastic sulphur, and adheres only very slightly to the vessel.

Treatment with hot water dissolves this substance rather readily, leaving a very small quantity of dirty yellowish-white powder. Water at 100° C (1 grm. to 1 litre) yields a very turbid liquid of a very light yellowish tint.

It was analysed October, 1888, with the following result:—

Catechin and tannic acid ...	..	84·9
Ligneous matter, &c. ...	...	·9
Moisture ...	...	14·0
Ash ...	...	·2
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 30·984 per cent.

No. 70. Sample received from Mr. F. M. Bailey, Colonial Botanist, Queensland, February, 1888.

Second in depth of tint, very like No. 67, but slightly lighter.

To cold water it yields a lemon-coloured solution rather paler than any of the others. To water at 100° C it yields a light brownish liquid, very turbid and very difficult to completely dissolve. Alcohol (B.P. tincture strength) yields a very dark olive-brown liquid.

It was analysed, October, 1888, with the following result:—

Catechin and tannic acid ..	...	81·3
Ligneous matter, &c. ..	...	2·0
Moisture ...	...	10·3
Ash ...	...	6·4
		<hr/>
		100·00

Tannic acid determination (Löwenthal) 27·926 per cent.

No. 71. Kino from Nowra, gathered March, 1888. Height, 60-80 feet. Diam., 1-2 feet.

The trees yielding this sample had been recently ringbarked, and bush fires had recently passed through the locality. The flow of kino was copious. This sample is exceedingly like No. 69 as far as outward appearance goes, though its odour is as powerful as No. 67.

It is the most readily soluble in cold water of all the samples of this species examined, nevertheless it behaves much in the same way as No. 67. Water at 100° C (1 grm. to 1 litre) yields a perfectly clear bright amber-coloured liquid. Alcohol yields an olive-brown liquid.

It was analysed August, 1891, with the following result :—

Catechin and tannic acid	...	...	83·0
Ligneous matter, &c.	...	...	·2
Moisture	...	...	16·6
Ash	...	...	·2
			<hr/>
			100·00

Tannic acid determination (Löwenthal) 53·5 per cent.

EUCALYPTUS MICROCORYS, F.v.M., B.Fl. iii. 212.

No. 72. "The Tallow-wood" of New South Wales, called "Turpentine" in Queensland, but not to be confused with the New South Wales Turpentine (*Syncarpia*). Sample of kino from New England, N.S.W., received 1886.

Kino of this species is less vesicular than that of *E. maculata*, but almost as readily reducible to a powder. This particular specimen is in small pieces, for the most part of the size of currants. In bulk it looks remarkably like a parcel of uncut garnets. Owing to its friability, the bright fractures become dulled with very little friction. Colour of powder orange-brown.

To cold water a yellow solution is yielded, with a slight tinge of brown, having a turbid residue of a dirty yellow colour with a

few black or dirty particles. Eventually almost everything dissolves, with the exception of a little accidental impurity.

It was analysed October, 1888, with the following result:—

Catechin and tannic acid ...	...	81·2
Resin ... ..	...	trace
Ligneous matter, &c. ...	...	·4
Moisture ... ..	...	18·1
Ash ... ..	...	·3
		<hr/>
		100·0

Tannic acid determination (Löwenthal), 54·349 per cent.

No. 73. A sample from Uralba, Wardell, N.S.W., collected May, 1891, has also been examined. It is a new sample with no important differences from the foregoing.

It was analysed August, 1891, with the following result:—

Catechin and tannic acid ...	76·39
Resin	·8
Ligneous matter, &c. ...	·87
Moisture	20·4
Ash	1·54
	<hr/>
	100·00

Tannic acid determination (Löwenthal), 50·45 per cent.

The presence of resin in a weighable quantity in this kino is worthy of notice.

No. 74. Two samples from Queensland, received from Mr. F. M. Bailey, F.L.S., Colonial Botanist.

The physical description of the preceding sample will apply here.

In cold water the layer at the bottom of the vessel becomes, if undisturbed, of the colour of treacle. The tint is precisely the same as that of a guaranteed sample of *Pterocarpus marsupium* kino received from India. It leaves a small quantity of a brown residue which produces turbidity if disturbed.

Water at 100° C. (1 grm. to 1 litre), yields a beautifully clear solution of the colour of colza oil. This remark applies also to the preceding sample.

It was analysed October, 1888, with the following result :—

Catechin and tannic acid ..	...	82.1
Resin ... ..	...	trace
Ligneous matter, &c. ..	...	.5
Moisture ... ..	...	17.2
Ash ... ..	...	.2

100.0

Tannic acid determination (Löwenthal), 56.888 per cent.

Mr. Staiger says of a Queensland sample of this kino :—" The specific gravity is about 1.395, and the percentage of tannin 53.33. The solution in water when evaporated yields brownish scales."

*Kinos not examined by me, yet, from the experiments of others,
evidently falling in the Turbid Group.*

EUCALYPTUS CALOPHYLLA, R. Br., B.Fl. iii. 255.

"Red Gum" of Western Australia.

Dr. Wiesner says of this kino :—" Readily soluble in water ; solution yellow, slightly acid, becomes turbid on cooling, free from gum-resin. Irregular grains, light brown or red."

Baron von Mueller says :—" Kino-liquid of treacle consistence is obtained in considerable quantity by tapping the tree ; it is caught in casks as material for tanning and dyeing purposes, and fetches from £20 to £25 per ton in the London market. This liquid indurates, and can, like the dry kino of this and other Eucalypts, be used also medicinally" (*Eucalyptographia*). Soluble to the extent of 70.80 per cent. in cold water (Mueller).

This species is mainly alluded to in the following passages, but the remarks apply equally well to many other species.

“Botany Bay (*sic*) kino, the ‘Red Gum’ of Western Australia* (*Gummi rubrum*), is the produce of several species of *Eucalyptus* (especially of *E. resinifera*,† Smith), which are widely distributed throughout the Australian continent.

“In physical characters and medical properties it is nearly allied to kino. It has been introduced into British practice by Sir Ronald Martin, who has found it very effectual in the treatment of chronic bowel complaints of invalids from India, but more especially in the chronic dysentery of Europeans. He regards it as less directly astringent, and more demulcent than catechin or kino. It has been highly reported of by several officers who have served in Western Australia, where the tree yielding it is abundant. . . . The drug possesses additional interest to the practitioner in India, from the fact that several species of *Eucalyptus* have become naturalised on the Neilgherries, and other high lands of India” (Waring, *Pharm. of India*).

This kino is probably alluded to in the following passage :—

“*Red Gum*.—A gum has been imported under this name from Western Australia, a specimen of which was laid on the table of the Pharmaceutical Society, 5th March, 1862. We call attention to this astringent gum as it is again being tried medicinally.” *Pharm. Journ.* [2] iv. 40.

EUCALYPTUS GLOBULUS, Labill., B.Fl. iii. 225.

The “Blue Gum” of Victoria and Tasmania. This well known tree appears to be by no means an abundant yielder of kino. A sample sent to Dr. Wiesner, of Vienna, some time ago, is thus described by him :—“Readily soluble in water, solution pale reddish-yellow, slightly acid, very turbid on cooling ; on heating becomes clear again. No gum-resin ; crumbling masses of light brownish colour.” I have been unable to procure properly authenticated specimens of this kino.

* The “Red Gum” of Western Australia is peculiar to that colony and is *E. calophylla*.

† Incorrect ; see these Proc. ([2], iv. 1280), and also *Pharm. Journ.* ([3], xx. 221, 321).

EUCALYPTUS TRACHYPHLOIA, F.v.M., B.Fl. iii. 221.

Found in Queensland.

“The analysis of one sample of kino gave us as much as 73 per cent. of kino-tannic acid (soluble in water and alcohol and precipitable by acetate of lead out of an acidified solution), $18\frac{1}{2}$ per cent. of kino red or allied substance (insoluble in water but soluble in alcohol), $8\frac{1}{2}$ per cent. gum and pigment (soluble in water, and partly in alcohol, but not precipitable by acetate of lead).” (Mueller, *Eucalyptographia*.)